I claim:

1. A pump for moving a fluid comprising:
    a. an actuator housing having a chamber for housing the fluid, the chamber having ports for accommodating fluid flow through the chamber;
    b. a plurality of individual actuators located in the chamber and in contact with the fluid;
    c. activating means for sequentially activating individual actuators,

    wherein each actuator, when activated, changes dimensions and exerts a displacing force on the housed fluid.

2. The pump of Claim 1 wherein the actuator housing comprises two or more chambers for housing the fluid in flow connection.

3. A pump for causing a fluid to flow at a determined rate comprising the pump of Claim 1 wherein the activating means is caused to activate individual actuators at a time and sequence selected to displace the fluid at the chosen rate.

4. A pump of Claim 1 comprising in addition a controller for the activating means whereby individual actuators are activated at a determined time.

5. The pump of Claim 4 wherein the controller is a programmable microprocessor in electrical connection with the activating means.

6. The pump of Claim 1 comprising in addition a sensor means for determining physical properties of the fluid wherein the sensor is in electrical connection with the controlling means and is capable of delivering signals received from the fluid to the controlling means..

7. The pump of Claim 1 wherein the physical properties to be sensed are selected from the group consisting of chemical composition, pH, pressure, temperature and flow rate.

8. A pump for moving a fluid in a determined path comprising the pump of Claim 1 wherein the positions of the actuators in the actuator housing are selected to define the flow path for the liquid when displaced.

9. The pump of Claim 8 wherein the actuator housing comprises more than one inlet port each port being capable of receiving an individual fluid and wherein individual flow paths are determined for each fluid.

10. The pump of Claim 8 comprising two or more outlet ports.

11. The pump of Claim 9 wherein the flow paths of individual liquids are allowed to intersect and thereby allow mixing of the displaced fluids.

.12. A pump for moving a fluid at a determined rate and in a determined path comprising the pump of Claim 1 wherein said activating means sequentially activates individual contiguous actuators at a selected time and the actuators are located on one or more walls of the inner cavity at positions selected to define a flow path for the displaced liquid when the actuators are activated.

13.. The pump of Claim 1 wherein the actuator housing is located inside a chamber containing the fluid, the chamber being a component of an on-line fluid processing system and the inlet port and outlet ports of the actuator housing are on the axis of flow in the fluid processing system. . ..

14. The pump of Claim 1 comprising in addition connecting means for coupling the actuator housing into an on-line processing system.

15. The pump of Claim 1 wherein at least one of said actuators is positioned near the inlet port of the actuator housing and, when activated, forms a barrier preventing backflow of fluid from the actuator housing.

16. The pump of Claim 1 comprising in addition an elastomeric impermeable lining located between the actuators and the housed fluid to prevent contact of the actuators and the fluid.

17. The pump of Claim 1 wherein the actuators are essentially inert and non-reactive with the fluid.

18. The pump of Claim 16 wherein the actuators are biocompatible.

19. The pump of Claim 1 wherein individual actuators are each encased in an essentially inert material.

20. The pump of Claim19 wherein .the material is semi-permeable to electrolytes.

21. The pump of Claim 17 wherein the material is non-permeable.

22. The pump of Claim 1 wherein the actuators are reversibly responsive elastomeric materials selected from the group consisting of electroactive polymers, electrolytically activated polymer gels, optically activated polymers, piezoelectric polymers, piezoelectric ceramic materials, chemically activated polymers, magnetically activated polymers, magnetically activated polymers and shape memory polymers.

23. The pump of Claim 1 wherein the actuators comprise electroactive polymers.

24. The pump of Claim 23 wherein each actuator is electrically shielded from contiguous actuators.

25. The pump of Claim 23 comprising an electrical means for activating individual actuators at a determined time.

26. The pump of Claim 23 comprising in addition a microprocessor in electrical contact with the electrical means, the microprocessor being programmed to drive the electrical means at a determined time whereby individual actuators are activated at a determined time and sequence.

27. The pump of Claim 1 wherein the actuators comprise electroactive gels that are activated by contact with electrolyte.

28. The pump of Claim 27 comprising a reservoir for housing an electrolytic solution.

29. The pump of Claim 28 comprising a permeable frit between the actuator and the electrolytic solution,

30. The pump of Claim 1 wherein the actuators are polymer gels activated by contact with an electrolytic solution, individual polymers are each encased with a semi-permeable material, the actuator housing comprises a reservoir for housing electrolytic solution and a fritlocated between the reservoir and the actuator and the activation means is an electrical circuit whereby electrolytic solution is caused to flow through the frit and semi-permeable material from the reservoir into contact with the polymer .and away from the polymer to cause reversible dimension change of the actuator.

31. The pump of Claim 30 wherein the electrical circuit is operated by a remote control device.

32. The pump of Claim 31 wherein the remote control device is infra-red or radio-frequency driven.

33. The pump of Claim 31 wherein the remote control device comprises a microprocessor programmed to activate the actuators at a selected time and sequence.

34. The pump of Claim 1 wherein the actuators comprise optically responsive polymers.

35. The pump of Claim 34 wherein the optically responsive polymers are ionized in the presence of light.

36. The pump of Claim 343 wherein the optically responsive polymers change pH in the presence of light.

37. The pump of Claim 36 wherein the polymers comprise anthracene.

38. The pump of Claim 34 wherein the activation of the optically active polymers is controlled by exposure to a laser beam of specific wavelength, natural light, a LED or a quantum light source.

39. The pump of Claim 38 wherein the time of light exposure is controlled by a remote control device.

40. The pump of Claim 39 wherein the remote control device is infra-red or radio-frequency driven.

41. The pump of Claim 34 wherein the control device is driven by a microprocessor. programmed to activate the actuators at a selected time and sequence.

42. The pump of Claim 1 wherein the actuators comprise electroactive polymers that a directly activated by signal from an electrical circuit.

43. The pump of Claim 1 wherein the actuators comprise a chemically activated polymer

44. The pump of Claim 1 wherein the actuators comprise a magnetically active polymer.

45. The pump of Claim 1 wherein the actuators comprise a thermally active polymer.

46. The pump of Claim 1 wherein the actuators comprise shape memory alloys

47. The pump of Claim 1 wherein the actuators comprise ceramic piezoelectric actuator.

48. The pump of Claim 1 wherein the actuators comprise polymer/ceramic piezoelectric combinations

49. The pump of Claim 11 as a fluid mixing device...

50. A pump for propelling an object along a surface comprising:

a. an actuator housing in contact with the object;

b. a plurality of contiguous actuators in contact with the actuator housing and in contact with the surface; and

c. activating means for sequentially activating individual actuators,

wherein each actuator, when activated, changes dimensions and exerts a displacing force on the surface and thereby propels the solid object .in a direction opposite that of the displacing force.

51. The pump of Claim 50 for propelling an object suspended on a liquid surface.

52. The pump of Claim 50 for propelling an object suspended on a solid surface.

53. The pump of Claim 50 for propelling an object submerged in a liquid.

54. A method of pumping a fluid at a controlled rate comprising placing the actuator housing of claim 1 into fluid contact with the fluid, activating a first actuator to prevent back-flow from the actuator housing and then repeatedly activating the contiguous actuators at a sequence wherein activation of one of the individual actuators occurs at a time after one of its contiguous actuators has been activated.

55. The method of Claim 54 for pumping fluids of different viscosities wherein the pump comprises two or more actuator housings in fluid connection and each actuator housing is operated at a different flow rate.